aggregate of Central Support (including Normal Central Assistance based on modified Gadgil-Mukherjee formula) and the State's Own Resources including Additional Resource Mobilisation, if any.

The sanctioned Annual Plan outlay for Bihar for 1994-95 was Rs. 900.00 crore(revised) and for 1995-96 it was Rs. 972.00 crore(revised). The anticipated expenditure for 1994-95 was Rs. 967.60 crore and the figure for 1995-96 is yet to be received.

Oil Pool Account

901 SHRI SANAT KUMAR MANDAL
SHRI SRIBALLAV PANIGRAHI

Will the PRIME MINISTER be pleased to state:

(a) whether the oil pool deficit at the end of the current financial year is likely to balloon to Rs. 15,500 crore as against the initial projection of Rs. 9,700 crore;

(b) if so, the reasons therefor;

(c) whether another round of hike in prices of petroleum products appears imminent, following increase in the crude prices in international market and burgeoning oil pool deficit; and

(d) if so, the decision taken by the Government to ward off the petro goods supply crisis?

THE MINISTER OF STATE IN THE MINISTRY OF PETROLEUM AND NATURAL GAS (SHRI T.R. BAALU): (a) to (d). The cumulative outstandings of the oil companies from the oil pool account which were Rs. 5,700 crores as on 31.3.96 are estimated to rise to Rs. 15,500 crores by 31.3.97. Deficits have arisen in the pool account because the sales realisation from the products did not fully cover the costs incurred. The position of the oil pool account is monitored on a continuous basis and remedial measures taken to contain the deficit.

Expedition to Antarctica

902 SHRIMATI VASUNDHARA RAJE
SHRI MULLAPPALLY RAMACHANDRAN

Will the PRIME MINISTER be pleased to state:

(a) whether the Government propose to set up a siesmic observatory in Antarctica;

(b) if so, the details thereof;

(c) whether the Government have taken decision to launch the next expedition i.e. 16th expedition to Antarctica;

(d) if so, the details and the preparations made therefor;

(e) the main purpose for which the next expedition proposed to be launched; and

(f) whether any foreign country is also undertaking the expedition with our scientists?

THE MINISTER OF STATE OF THE MINISTRY OF PLANNING AND PROGRAMME IMPLEMENTATION AND MINISTER OF STATE OF THE MINISTRY OF SCIENCE AND TECHNOLOGY (SHRI YOGINDER K. ALAGH): (a) Yes, Sir.

(b) Studies on seismic activities as recorded in Antarctica will be undertaken for the first time from the Indian station by the scientists from the CSIR Laboratory, namely National Geophysical Research Institute (NGRI), Hyderabad. A scientist from NGRI will accompany the 16th Expedition as a summer member with the task to identify a suitable location in the Schirmacher Oasis region of Antarctica where this Observatory can be commissioned. Subsequently, it is proposed to set up a digital broad band seismograph as a part of the seismic observatory with the following scientific objectives:

(i) To monitor and study the frequency and strength of seismic activity in Antarctica.

(ii) To record seismic shocks originating over the Indian Ocean sector of the Southern Oceans.

(iii) As a part of world wide seismic network, it is envisaged that the data generated from this Observatory will help to delineate the deep geological structure of Antarctica and also the gross seismic features of the earth as a whole.

(c) Yes, Sir.

(d) The 16th Indian Scientific Expedition to Antarctica is tentatively scheduled to be launched on the 12 December, 1996 from Goa. The expedition will sail on the chartered Norwegian ice-strengthened vessel 'MV Polar Bird' and will be accompanied by two chartered Ecquirell helicopters. These helicopters will be used for rendering air support from ship to the Indian Station 'Maitri' and will also assist in establishing field camps for scientific work. All arrangements concering the launching of the expedition including the finalisation of the scientific and logistic objectives have been completed. Orders for all store-items including food provisions, kit clothing, medicines, spares for various life support systems, fuel and communication equipments, etc. have already been placed.

The 16th Antarctic Expedition will comprise of 62 members out of which 39 are scientists drawn from 21 national institutes, laboratories and universities. The remaining 23 members have been drawn from the Indian Army who will provide the essential logistic support to the expedition. The expedition will have two components comprising of 26 winterover members (who will return to India in March, 1998) and 36 will be summer members (who will return in March, 1997). This expedition will be led by a Scientist from the India Meteorological Department.

(e) The scientific objectives and logistic tasks of the 16th Expedition are given in the Statement.

(f) No, Sir.

STATEMENT

Scientific Objectives of the XVI Indian Antarctic Expedition

A. Atmospheric Sciences :

(I) *Vertical profiling of ozone and dynamics of ozone hole* : The National Physical Laboratory has designed a state of the art experiment by using a Laser Heterodyne System (LHS) designed to yield the vertical profile of ozone and other minor trace gases in the atmosphere upto a height of 60 km. This equipment will be made operational on a year round basis, whereby sun beam willbe heterodyned with a laser beam to get a spectral intensity through a 1 GHz acoustic optic spectrometer. This data will be converted through inversion layer technique to measure the absorption lines of ozone and water vapor in the atmosphere. This will give insights to the dynamics of ozone hole phenomenon over Antarctica. A special hut has been erected to house this equipment and a separate liquid nitrogen plant will be set up to provide the coolant for the machine.

(II) *Fluxgate Magnetometer Studies* : This is an ongoing study to be continued by the Indian Institute of Geomagnetism, Bombay, and is to understand the dynamics of mobile current systems in the Antarctic atmosphere. Three fluxgate magnetometers and riometers will be operated at the three vertices of a triangle with the objective to obtain velocity of mobile auroral current systems that leave back geomagnetic puslations. This study will give insights to the following near and deep space processes :

(a) Quiet time diurnal and seasonal changes in the geomagnetic field:

(b) Geomagnetic field variations in response to ionospheric and magnetospheric field aligned currents:

(c) HF radio communication in response to electromagnetic disturbances:

(d) Harang Discontinuity feature of the auroral oval at Maitri.

(III) *Climatological and Meteorological Studies* : This is being pursued by Indian Meteorological Department since the first expedition with the aim to built up a Climatological data set of Antarctica on a decadenal scale. This information will be used to generate meteorological models to understand the patterns of Antarctic circulation in the context to global and Indian weather systems. A permanent and continuous observatory for recording and transmitting weather parameters, reception of satellite cloud imagery and weather chart broadcast already exists and will be operational during the XVI Expedition. Regular ozonesonde ascents will also be carried out to monitor surface and near surface ozone conditions. This will be used to supplement the data obtained from the LHS of NPL. In the XVI Expedition, radiation budget studies will be supplemented by radiometersonde ascents. Diffused radiation observations will be taken in addition to direct radiation observation.

(IV) *Electrical Conductivity and Aerosol Particle Distribution Studies* : This is a new experiment to be initiated by the Indian Institute of Tropical Meteorology, Pune. In this experiment, it is proposed to measure the atmospheric electric field along with size distribution of fine aerosol particles over Antarctica and during the sea voyage. The main objectives of these measurements are as follows :

(a) Study the diurnal variation of electric field and air-earth current at Maitri vis-a-vis global electric circuit and solar terrestrial effects.

(b) Study the inverse relation between electric conductivity and aerosol concentration with change in the size spectra of atmospheric aerosols.

(c) To study the change in electric conductivity with latitute and examine the validity of ion-aerosol balance equation.

B. Earth Sciences :

(I) *Geological Mapping and Glaciological Studies* : These studies are to be continued by the Geological Survey of India (GSI). Geological mapping will be carried out to cover an unmapped area of 1000 sq. km in the Kurze and Holtedahl ranges of Orvin II mountains during the XVI Expedition. Samples will be collected from Schirmacher hills for laboratory analysis in order to understand the petro-geochemical evolution. Glaciological studies are aimed to decipher the ice dynamics through monitoring of Dakshin Gangotri polar ice front. Snow accumulation and ablation study data on ice shelf will be used for inputs to mass balance studies.

(II) *Geological Evolution of Schirmacher Hills, East Antarctica* : This is a multifaceted study initiated by the Dept. of Geological Sciences, Jadavpur University in the XV Expedition. The aim of this ongoing project is to understand the structural, petrological, geochemical and geochronological signatures in the rocks of the Schirmacher Oasis so as to elucidate the history of crustal evolution of the area. The pressure and temperature regime under which the litho-units were generated will be studies by investigating the grades and stages of metamorphism. Special emphasis will be given to study microstructures of high temperature mylonites to decipher the deformation history of the area in order to co-relate with other shield areas of the Gondwanaland.

(III) *Snow Drift and Albedo Studies in Antarctica* : This is an ongoing study to be continued by Snow and Avalache Study Establishment (SASE) for understanding the net energy exchange budget between the atmosphere and the variety fo terrains encountered in Antarctica. The reflectivity of the snow cover surface ie. the albedo, which is the most crucial factor in controlling the energy balance, will be measured through a number of experiments under different physical conditions. These studies are aimed to determine the dependance of snow albedo on snow surface parameters like age of snow, grain size and type of snow, cloud cover, solar elevation etc

The strong winds over the snow surface causes a shear resulting into a snow drift from the continent into the surrounding oceans. This plays a significant role in the heat balance of Antarctica. The transport of snow under various conditions will be enumerated in this study in order to understand the drift density profile various conditions like temperature, snow hardness, free water content and surface features.

(IV) *Hydro-Geochemistry, Thermal Structure and Sedimentology of Lakes* : This is a new proposal to be undertaken by Indian Institute of Technology, Kanpur. Studies on Lake Sediments representing annual depositional episodes can throw light on climatic fluctuations which are very well manifested in the mineralogical and chemical variations in the sediments. The specific objectives of the proposed studies on varve stratigraphy are as follows :

(a) Detail geochemical analysis of lake water including isotopic composition.

(b) Analyse the thermal structure of the lake in order to understand the heat budget.

(c) Sediment core analysis for mineralogical studies.

(d) To unravel the paleoclimatic flucturations as recorded in the sediments from the above analysis.

(V) *Teleseismic Studies* : Studies on seismic activities as recorded in Antarctica will be undertaken for the first time from the Indian station by the scientists from the National Geophysical Research Institute, Hyderabad. It is proposed to set up a digital broad band seismograph as a part of the seismic observatory with the following objectives :

(a) To monitor and study the frequency and strength of seismic activity in Antarctica.

(b) To record seismic shocks originating over the Indian Ocean.

(c) As a part of world wide seismic network, it is envisaged that this study will help to delineate the deep seismic structure not only of Antarctica but also of the earth as a whole.

(VI) *Topographic and Geodetic Survey* : Survey of India will carry out a detailed topographical survey for preparing the following maps :

(a) The new site location for an alternative summer camp setup in the vicinity of Maitri along with a close contour map indicating the drainage and topography.

(b) Delineating and demarcating the covoy route from shelf to the dozer point near Maitri using GPS system.

(c) In assiciation with SASE and Naval Hydrography, Survey of India will conduct a systematic survey of the ice shelf around the Indian Bay in order to identify a suitable berthing place for the expedition vessel.

(VII) *Hydrographic Studies* : A team from Naval Hydrography will carry out hydrographic survey in the areas falling within IHO chart Nos. 9050 and 9051, forming the approach waters to the Indian Bay in Antarctica. In addition, Naval Hydrography will also assist SOI and SASE for charting the shelf margin in the Indian Bay region. This study will also help to build up a data set required for preparing Bathymetric and navigational charts along with information on physical oceanography parameters and sea level.

C. Environmental Sciences :

(I) *Environmental Impact Assessment Studies* : With the ratification of the Protocol on Environmental Protection to the Antarctic Treaty, it is necessary to carry out proper environmental impact assessment studies and generate baseline parameters of the surrounding environment in Antarctica. Accordingly, as a part of ongoing programme, a scientist from Banaras Hindu University (BHU) will participate in the XVI Expedition with the aim to monitor the status of air, noise, water, biological and land components in and around the areas of our operation. This study will also help to generate a waste management plan for Maitri and draw an environment evaluation plan.

D. Medical Sciences :

(I) *Studies on Human Physiology* : The All India Institute of Medical Sciences will continue experiments to co-relate circadian rhythmicity and metabolic status of personnel exposed to the severe Antarctic conditions in order to understand the adaptive processes. The study will include monitoring of heart rate, body temperature, body composition, liver tests, food intake and the related physicoempotional studies. In addition, following experiments will be undertaken in the XVI Expedition :

(a) Interaction of opiods and altered photoperiod in immunomodulation during Antarctic winters.

(b) Geomagnetic effects on neuro-behavioural measures and reproductive system.

(c) To determine the relationship of UV-B radiation and Vitamin-D metabolism.

(d) Melatonin and body temperature coupling.

(II) *Biochemical Evaluation of Nutritional Requirements* : Defence Institute of Physiology and Allied Sciences (DIPAS) will mount a new initiative to study the nutritional aspects in order to evaluate the effects of physiological stress and resultant metabolic requirements to which a subject is exposed to in cold contitions. This study is also useful in contest with the Himalayan regions of the country. The primary objectives of this study are :

(a) To rationalize the nutritional requirements of the members of Antarctic Expedition (both summer and winter)

(b) To evaluate the effects of supplementation of specific antioxidants vitamins and minerals with regard to the physiological acclimatization and performance of the expedition members.

E. Biological Sciences :

(I) *Long Term Monitoring of Mammals and Birds* : This is a continuing project being undertaken by the Wildlife Institute of India, Dehradun to devise a monitoring system for population dynamics for mammals (only seals) and avian taxa. This will be carried out to define and evaluate the ecosystem health and the inter-species relationship. Monitoring protocols will be developed that can be applied on a long term basis to understand the vital aspects of the fauna assemblage on a time series analysis. The data obtained can contribute to the international APIS project being undertaken under the aegis of SCAR.

(II) *Polar Horticulture* : Defence Agricultural Research Laboratory will continue experiments on development packages for practices for protected polar vegetable production in Antarctica. Within the greenhouse already present at Maitri the following experiments are proposed to be conducted :

(a) Performance of vegetable crops in different kinds of media.

(b) Effect of naural radiation on vegetable seeds.

(c) Yield performance of beans/peas influenced by legume.

(d) Effect of UB-V radiation and ozone depletion on plant photosynthesis.

(III) *Studies on Bryo-vegetation* : As a part of studies on bio-diversity of Antarctica, Botanical Survey of India (BSI) for the first time, will carry out a taxonomical survey of Brophytes including both mosses and liverworts in the Schirmacher Oasis. These plants play an important role in the ecosystem such as, the nutrient status and primary productivity. Hence, a detailed study of their distribution can be used as Biomonitors and Bioaccumulators in a particular ecosystem. This project is designed to address the following :

(a) Morpho-taxonomy and floristics of bryophytes

(b) Phytogeographical affinities vis-a-vis Indian occurences.

(c) Development of an 'Environmental Specimen Bank' in context with ecomonitoring.

F. Engineering and Communication :

(I) *Structural Engineering Studies* : Research and Development Engineering Establishment, Pune has been entrusted to undertake a study on condition monitoring of the structural components of the station under low temperature conditions. A novel aspect of these studies includes an on-line monitoring facility between Antarctica and R and DE Pune through INTERNET facilities. Experments for the improvements and upgradation of infrastructural facilities like water supply, heating, electrical systems etc. will also be taken up.

(II) *Communication* : The Defence Electronics and Application Laboratory of DRDO has been given the complete responsibility of maintenance and upgradation of the communication linkages from Maitri. This includes Maitri to India communication, Maitri to convoy communication and convoy to convoy communication using various modes.

In addition, DEAL will carry out the following experiments :

(a) Upgradation of data and voice communication between Maitri and India using high speed modems and computer interfacing.

(b) HF propagation studies as a factor of ionospheric conditions and geomagnetic storms.

(c) VHF Propagation vis-a-vis radiometeorlogical conditions.

(d) Packet Beacon experments to specify ideal frequency and time schedule.

(e) Experiments on transmission techniques of still picture frames.

(III) *Wind Energy Utilisation In Antarctica* : With the available data on energy needs of the station a simulation study as to the possible energy inputs through renewable energy devices, particularly wind would be undertaken for the system designing purposes for the first time by the National Aeronautical Laboratory. In this expedition, it is proposed to install continuous data logging systems over a 28 meter mast. In addition, a detailed study of energy demand of the station will be made. With the available data, NAL will design a suitable turbine generating system that can be operated in Antarctic conditions.

(IV) *Fire Fighting Engineering* : In addition to the routine upkeep of the fire fighting equipments in Maitri, a scientist from the Defence Institute of Fire Research (DIFR) will carry out testing and installation of the linear thermal fire detecting system which is a modern technique to guard and detect fire breakouts.

The following logistic tasks for the XVI expedition have been identified :

(a) De-induction of four gensets from the A Block of Maitri and their relocation in containerized accommodation.

(b) The space thus created will be converted into a full-fledged MI room comprising of OT, examination room, x-ray and dark room, sterilization room, linen and medical store room.

(c) The replacement of MEG mixture as an antifreez in the main water supply line with electrical trace coil heating system.

(d) All disused items including the non operational green-house, loose barrels, food dumps unoperational vehicles etc. will be backloaded as a part of a clean-up operation. A special Environment Task Force under the overall co-ordination of the environment Officer-cum-observer for this purpose will oversee the whole operation.

(e) A modified door for the vehicle garage cum workshop and panels for the balloon launching hut will be provided to complete these structures.

(f) Upkeep of station infrastructure and all life support systems as a part of regular maintenance task.

(g) Upgradation and regular maintenance of communication systems.

(h) Upkeep of fire equipments of Maitri and updating the serviceability of all fire fighting equipments. Both the exterior and interior of the station complex will be painted with fire retardent paints as a precautionary measure.

Conversion of MIG Flats

903. SHRI RAM SAGAR : Will the PRIME MINISTER be pleased to state :

(a) whether attention of the Government has been drawn to the news item captioned "MIG flats converted into SFS" appearing in the Times of India dated September 20, 1996;

(b) if so, the facts thereof;

(c) the number of MIG flats meant for registrants under New Pattern Scheme, 1979 converted into self financing scheme in Vasant Kunj and put up for sale under the 9th self finance scheme by the DDA depriving the registrants of the flats and making their waiting still longer; and

(d) whether there is any proposal to withdraw these flats from the 9th SFS and allot the same to the MIG registrants under NPS 1979?

THE MINISTER OF STATE IN THE MINISTRY OF URBAN AFFAIRS AND EMPLOYMENT AND MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS (DR. U. VENKATESWARLU) : (a) Yes, Sir.

(b) and (c) The DDA has reported that 201 MIG flats in Vasant Kunj have been converted into category II SFS flats. The conversion has been done on account of the fact that the plinth area of these flats is 81-92 sq. mtrs., while the plinth area of the MIG flats as notified in the brochure is 65 sq. mtrs. only. 195 of these 201 flats have been offered for sale under the 9th Self Financing Scheme and the remaining six flats are meant for allotment on out of turn basis in accordance with the prescribed guidelines.

(d) No, Sir.

Solar Energy

904. SHRI MULLAPPALLY RAMACHANDRAN : Will the PRIME MINISTER be pleased to state :

(a) the total energy production from solar energy recorded in the country over the past twelve months;

(b) whether some States have sought permission to set up new projects for tapping solar energy by themselves or with foreign assistance;

(c) if so, the details and reaction of the Government;

(d) whether any private undertakings are involved in harnessing solar energy; and

(e) if so, the details thereof?

THE MINISTER OF STATE IN THE MINISTRY OF POWER AND MINISTER OF STATE IN THE MINISTRY OF NON-CONVENTIONAL ENERGY SOURCES (DR. S. VENUGOPALACHARY) : (a) Solar energy is used through two main routes, the thermal route in which the heat is used for water heating, cooking, drying, etc. and the photovoltaic route for generation of electricity which can in turn be used for several purposes. A large number of solar energy systems have been installed in the country to function in a decentralised mode and provide energy for specific uses. It is estimated that during the past 12 months, abotu 234 million kilowatt hours of thermal energy and 22.5 million units of electrical energy were generated through solar thermal and photovoltaic systems respectively.

(b) and (c). An integrated solar combined cycle power plant with a capacity of 140 MW is proposed to